SPINDEX®

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TOOLS™
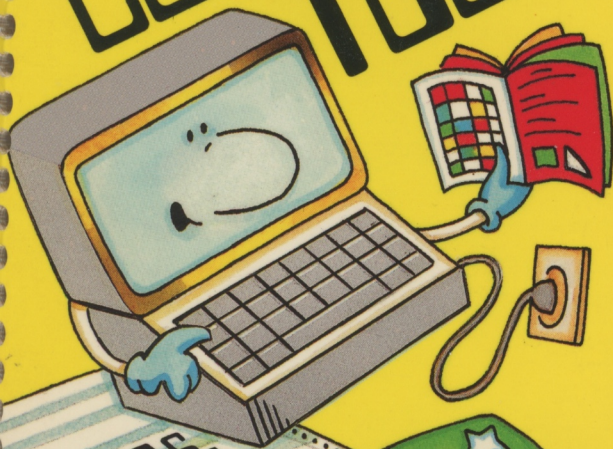
STICKERS,
STENCILS,
FLOWCHARTS,
HOW-TO
PROGRAM,
GRAPHICS,
GAMES AND
MORE

A UNIQUE COMPUTER REFERENCE KIT

Games, worksheets, labels, stickers and stencils to help students at all levels.

Everyone will find easy-to-understand reference charts and glossary.

"This could be the start of a wonderful relationship..."

DISK OR CASSETTE LABELS

NAME_____
DISK NO._____
TITLE_____
_____

NAME_____
DISK NO._____
TITLE_____
_____

NAME_____
DISK NO._____
TITLE_____
_____

NAME_____
DISK NO._____
TITLE_____
_____

PROGRAM RECORD FILE LABELS

DISK NO.	SUBJECT	DATE FILE

DISK NO	SUBJECT	DATE FILE

PROGRAM LABELS

BASIC

PROGRAMS

HARDWARE STIX

GLOSSARY

GAMES

GAME-STIX

STENCILS

STENCILS

COMPU-STIX

More Labels

DISK NO.	SUBJECT	DATE FILE

NAME _____
DISK NO. _____
TITLE _____
_____

NAME _____
DISK NO. _____
TITLE _____

HARDWARE GAMESTIX

PRINTER

MODEM

TAPE

MONITOR

KEYBOARD

DISC DRIVE

BASIC

PROGRAMS

GLOSSARY

HARDWARE STIX

GAMES

GAME-STIX

STENCILS

STENCILS

COMPU-STIX

STENCILS

Labels for your computer

IND	POKE	CHR/
LIST	THEN	PRINT
ROM	READ	RETURN
CLEAR	NEXT	NEW
GOSUB	SAVE	INPUT
HOME	EDIT	CONT
FOR	END	IF

QUIZ CHAMPS!

Superbrite!

NO GLITCHES HERE

1¢ PRINT
2¢ PERFECT
3¢ SCORE

Program Maestro

COMPUSTIX

GLITCH

NESTED LOOP

EXE CUTE

DE BUG ME!

OVERLOAD

CO···

BASIC

PROGRAMS

GLOSSARY

GAMES

STENCILS

STENCILS

COMPU-STIX
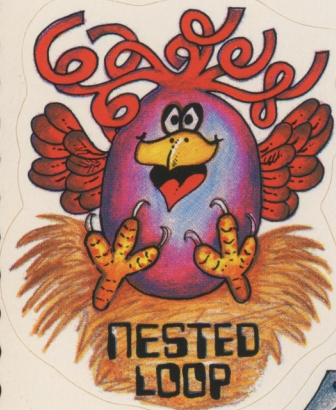
CONCEPTS
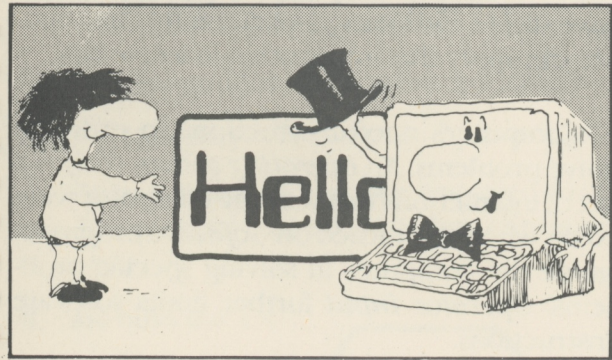
Computers, like people, are able to solve problems. However, they cannot solve all problems with equal skill. Why not?

People make decisions based on information they receive from their five senses, stored knowledge (memory) and feelings. They don't have to follow a routine for decision making. Computers make decisions in a simpler way.

Computers solve problems in small steps. The *program* puts the steps in order and assigns choices to each step. As the computer reaches a step, it must choose to continue its path (a "yes/on" choice) or to change direction (a "no/off" choice).

Like an electric saw or a drill, a computer is a tool. Computers cannot develop 'original' ideas. They can only take information they have stored and arrange it differently. Only people can apply that information in a new way.

Computers need instructions in order to solve problems. An *operating system (OS)* is a set of instructions that tells the computer what to do when it is turned on. *Software programs* guide the computer in solving specific problems. *Operator input* further limits software instructions.
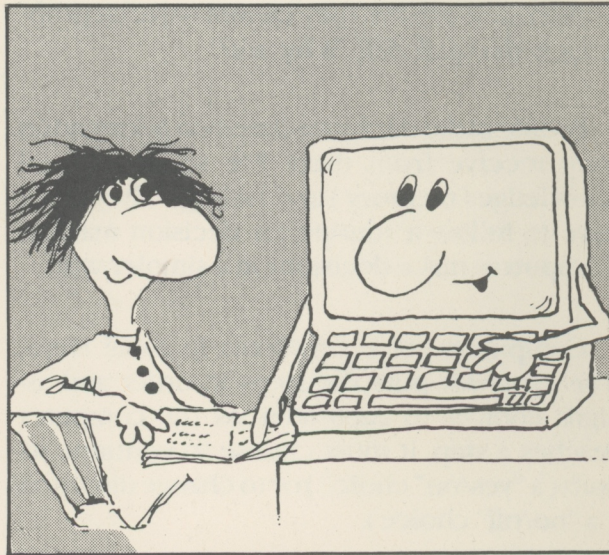
HOW COMPUTERS MAKE DECISIONS

1. Both Sue and Jim want to buy a $100 T.V.

2. In 3 mos. they will compare their savings.

3. They compare savings. Sue has saved $100, but Jim has only saved $10. Jim continues to save.

4. Sue buys the T.V.
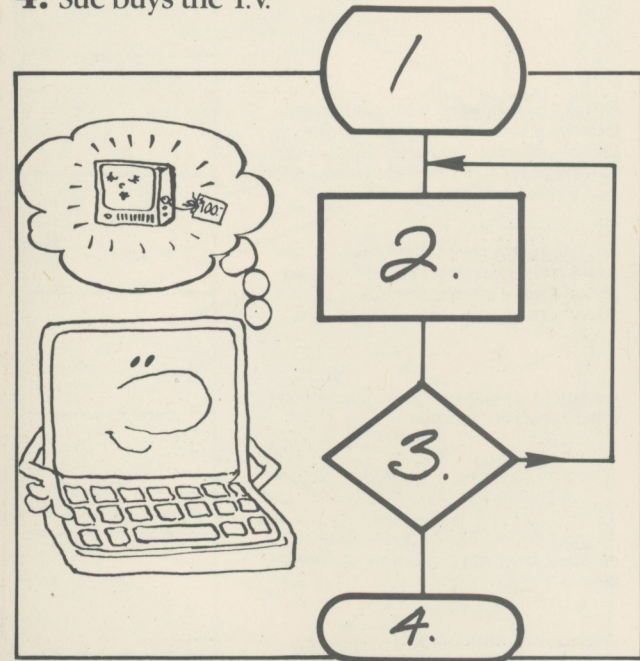
HARDWARE GAME

Match the description to the drawing on the following page—use the stickers in the front of this book.

An <u>output device</u>. Displays on a television screen all the information requested through a keyboard, graphics tablet, joy stick or touch screen sensor (a "mouse"). Also known as a monitor, CRT (Cathode Ray Tube) or VDT (Video Display Terminal).

An <u>input/output device</u>. It uses magnetic tape in a cassette.

An <u>input/output device</u>. It can read information from a floppy disk (a magnetic storage device) and input it to the computer. It can take the computer's information output and store it on a floppy disk.

An <u>input/output</u> device that turns computer codes into signals that are sent over telephone lines. It permits computers to send and receive information from each other.

An <u>output device</u> providing paper copy ("hard copy") of information.

An <u>input</u> device for a computer. Combines standard letter keys plus special function keys.

(Answer on back of this section.)

PLACE CORRECT STICKERS HERE

LABEL THE PARTS
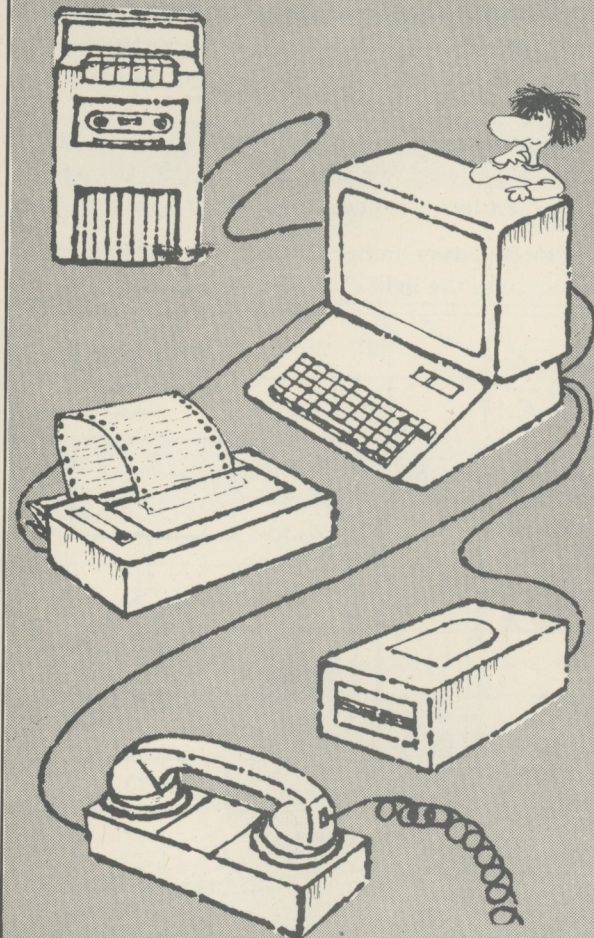
BASIC

PROGRAMS

GLOSSARY

GAMES

STENCILS

STENCILS

STENCILS

HOW COMPUTERS LOOP

A. Dudley is standing at a corner waiting for the light to change.

B. Dudley looks down at the street.

C. He looks up to see if the light has changed. It hasn't. He looks down at the street. He looks up to see if the light has changed. It has. He crosses the street.

The loop is the number of times Dudley looks down and up until the light changes.
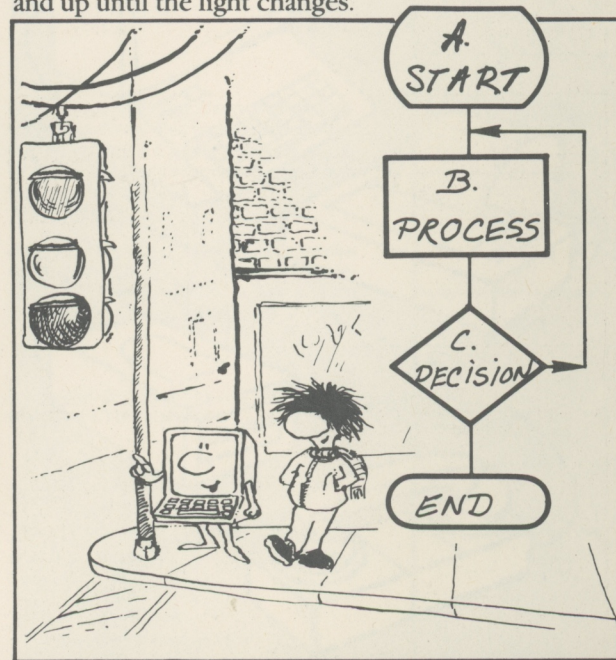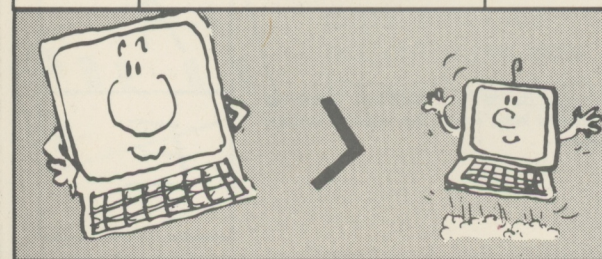

MATH CONNECTORS

Computers make decisions by comparing values. <u>Relational operators</u> allow a computer to compare one numerical value with another.

THE THREE RELATIONAL OPERATORS		
Symbol	**Meaning**	**Example**
=	is equal to	A = B
>	is greater than	A > B
<	is less than	A < B
COMBINING THE OPERATORS		
<>	is not equal to	A <> B
>=	is greater than or equal to	A >= B
<=	is less than or equal to	A <= B

An <u>output device.</u> Displays on a television screen all the information requested through a keyboard, graphics tablet, joy stick or touch screen sensor (a "mouse"). Also known as a monitor, CRT (Cathode Ray Tube) or VDT (Video Display Terminal).

An <u>input/output device.</u> It uses magnetic tape in a cassette.

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An <u>input/output</u> device that turns computer codes into signals that are sent over telephone lines. It permits computers to send and receive information from each other.

An <u>output</u> <u>device</u> providing paper copy ("hard copy") of information.

An <u>input</u> device for a computer. Combines standard letter keys plus special function keys.
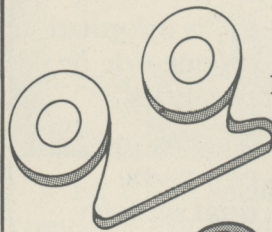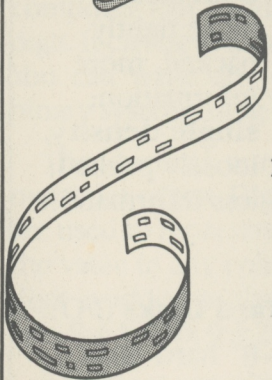
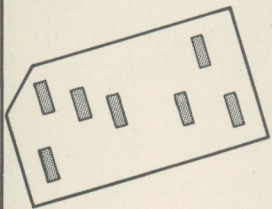| |
|---|
| D |
| C |
| F |
| B |
| A |
| E |

How Information Is Stored
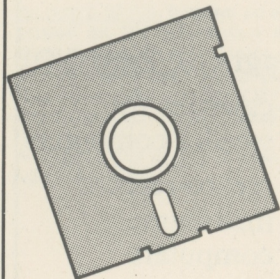

1. **Magnetic Tape** (I/O)
   —cassettes for smaller computers
   —reel-to-reel for mainframe computers

2. **Paper Tape or Punched Tape** (Input thru tape reader/Output thru keypunch machine)

3. **Punched Cards** (Input thru card reader/Output thru keypunch machine)

BASIC

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STENCILS

STENCILS

STENCILS

4. **Floppy disks** (I/O)

—8″ or 5½″ in diameter

—holds information on one-side or two sides

—information held two ways: **dual density,** more tightly packed, more information; **single density,** loosely packed, less information.
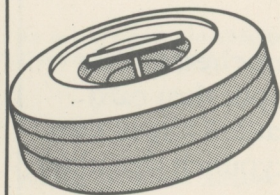
5. **Hard Disks** (I/O)

—8″ hard disks

—Winchester disks (disk encased in hard plastic case) usually not removable

—Video & Laser Disks

BINARY NUMBER SYSTEM
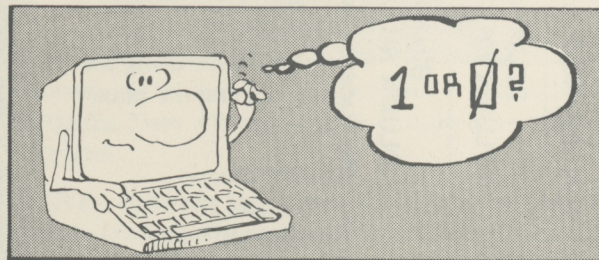
A bit is the smallest unit of information a computer can handle. Bit is short for binary digit. It can be a number one or a number zero. You can write any number you want in the binary system using only these two symbols.

The decimal number system is based on multiples of ten. Digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 are used to represent value in a column. When the value in any column is greater than nine, a digit is added to the next column on the left. (ex. $9 + 1 = 10$; $9 + 2 = 11$)

The binary number system is based on multiples of two. Digits 1 and 0 indicate if value exists in a column. If it does, a 1 is noted; if not, a 0 is noted.
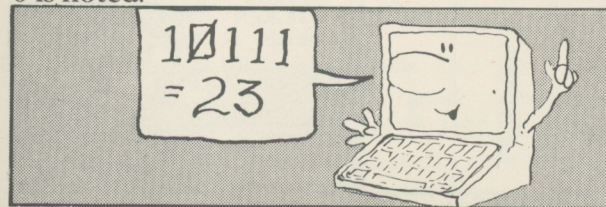
COLUMN NUMBER	DECIMAL COLUMN VALUE	BINARY COLUMN VALUE
1	1-9	1
2	10	2
3	100	4
4	1,000	8
5	10,000	16
6	100,000	32
7	1,000,000	64

EXAMPLE:
Write the number twenty-three using the decimal and the binary systems.

ANSWER:
Decimal (23)
Binary (10111)

QUIZ
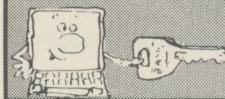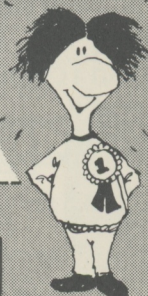Write the decimal equivalent of the following binary numbers:

111_____

1011_____

101_____

110010_____

10010_____

PLACE
QUIZ
CHAMP
STICKER
HERE

Answer: 7, 9, 5, 50, 18)

BASIC KEYWORDS

Keywords in the BASIC vocabulary instruct the computer. They are used in the writing of computer programs.

PRINT—instructs the computer to put data on the display terminal. Quotation marks enclose data to be displayed.

LET—assigns a number value to a letter. (Example: LET A = 5)

GOTO—tells the computer what program line to go to next. Since programs are step by step routines for the computer, each line is numbered. GOTO is a loop word used in a GOTO program routine. (Example: GOTO 3Ø)

FOR and NEXT are always used together. They create a program loop.

FOR—statement assigns a number value where the operation should begin and a number value where it should end. (Example: Suppose you wanted the computer to count from 1 to 6. You would write the following statement: (FOR C = 1 TO 6). This means begin when C is 1 and continue repeating the program until C is 6.)

NEXT—controls the program loop. After C = 1 goes thru the program routine, NEXT sends it back and compares it with the end value of the FOR statement. Until C = 6, NEXT will continue to send it back. When C is 6, the program will go out of the loop and onto the

instruction line of the program following NEXT. To make all this happen, you only have to write: (NEXT C).

IF-THEN—a condition statement to stop a loop routine. It does this by establishing a numerical value for comparison when such a value has not been established earlier (as in a FOR statement). (Example: IF N<50 THEN 20. This means if N is less than 50, return to line 20 and repeat the steps until you get to the line with the IF-THEN statement.)

BASIC COMMANDS

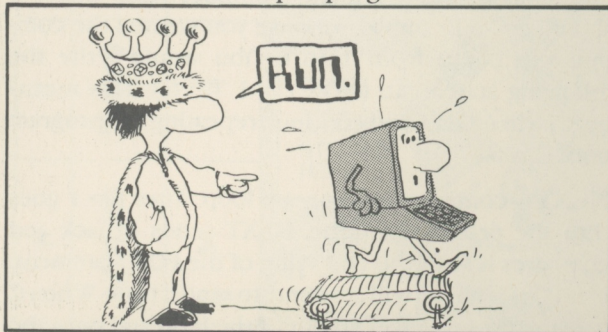Commands are typed into the computer and are executed immediately.

NEW—erases all information stored in RAM.

RUN—starts your BASIC program working.

LIST—tells you line by line all the instructions that you entered into the RAM.

CONT—starts the program running again after the user stopped it.

STOP or **BREAK**—stops a program routine.

SYNTAX QUIZ!
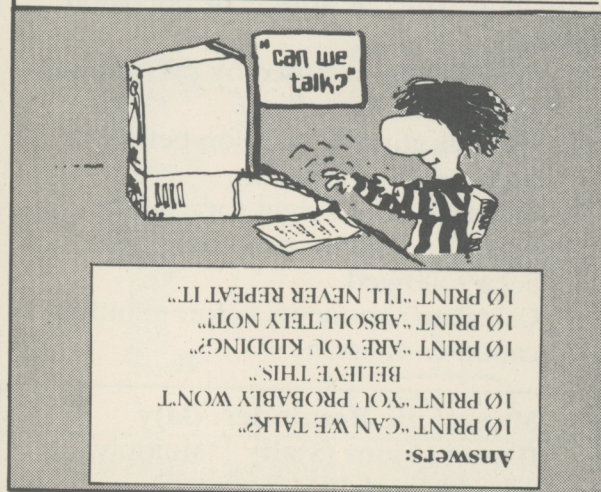### Find the error in each BASIC Command.
1Ø PRINT CAN WE TALK?
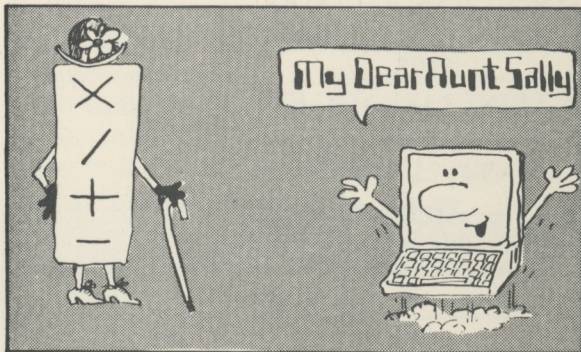1Ø PRINT "YOU PROBABLY WON'T BELIEVE THIS.
TEN PRINT "ARE YOU KIDDING?"
1Ø PRINTS "ABSOLUTELY NOT!"
1Ø PRINT "I'LL NEVER REPEAT IT.

Write answers here:

_____

_____

_____

_____

Answers:
1Ø PRINT "CAN WE TALK?"
1Ø PRINT "YOU PROBABLY WON'T BELIEVE THIS."
1Ø PRINT "ARE YOU KIDDING?"
1Ø PRINT "ABSOLUTELY NOT!"
1Ø PRINT "I'LL NEVER REPEAT IT."

PROGRAMMING

My Dear Aunt Sally

RULES OF PRECEDENCE

Some programs require the computer to do more than one arithmetic operation in a line.

1. Calculations enclosed by parentheses ( ) will be done first.
2. Multiplication & Division before addition & subtraction.
3. Calculate left to right for a single type of operation precedence has been followed.
4. Calculate exponents before multiplication & division.

Mnemonic Reminder: (M)y (D)ear (A)unt (S)ally (*Multiply, / Divide, + Add, − Subtract)
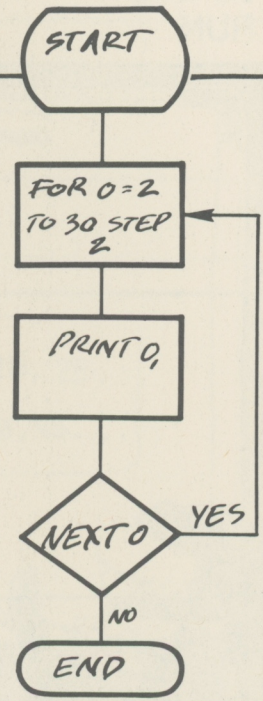
BASIC Program Example

Problem: Write a program that will count by 2's from 2 to 30.

Solution: Use Keywords
FOR – NEXT – STEP

```
1Ø FOR 0 = 2 TO 3Ø STEP 2
2Ø PRINT 0
3Ø NEXT 0
4Ø END
```
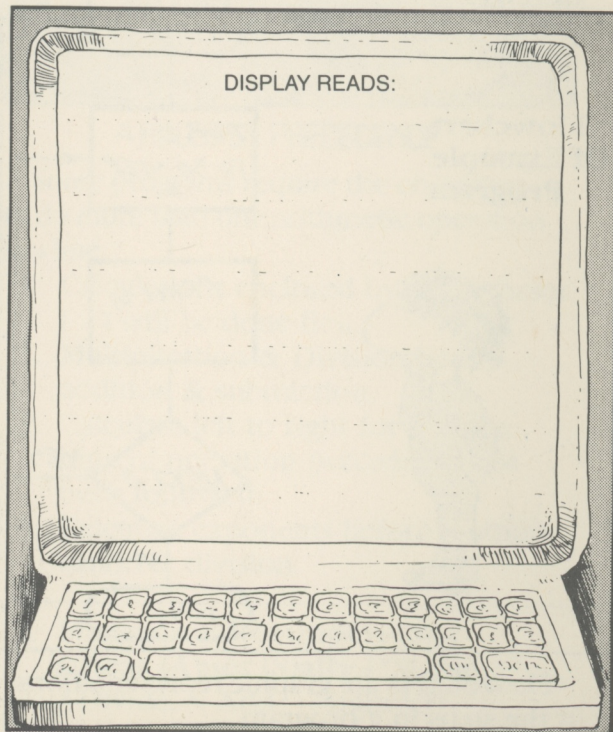
Flowchart Of Example Program

Flowcharts are graphic representations of the steps in a program.

WHAT'S THE OUTPUT?

1Ø CLS (Clears the Screen)
2Ø FOR A—100 TO 115 STEP 1
3Ø PRINT A; ","
4Ø NEXT A
5Ø END
RUN

DISPLAY READS:

PROGRAM CHALLENGE

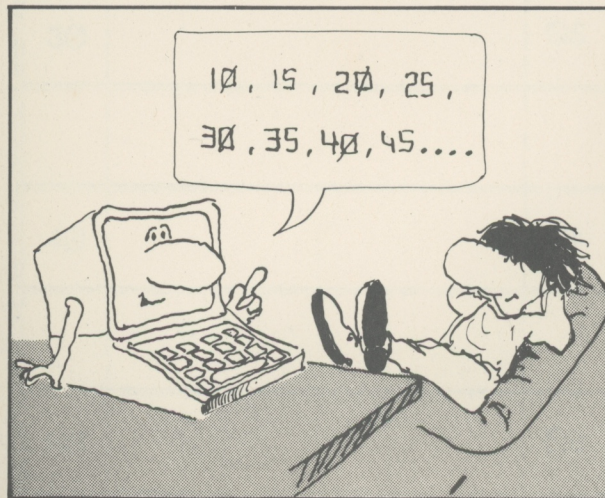Write a program that will count by 5's beginning at 5 and stopping at 200.

1Ø CLS _____

2Ø _____

3Ø _____

4Ø _____

5Ø _____

(Answer on back of this section.)

1Ø, 15, 2Ø, 25, 3Ø, 35, 4Ø, 45....

PROGRAMMING PAPER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1Ø																				
2Ø																				
3Ø																				
4Ø																				
5Ø																				

PROGRAMMING PAPER

	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1Ø	
2Ø	
3Ø	
4Ø	
5Ø	

SOLUTION TO WHAT'S THE OUTPUT PROGRAM

100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115

SOLUTION TO THE PROGRAM CHALLENGE

```
1Ø CLS
2Ø FOR A = 5 TO 200 STEP 5
3Ø PRINT A;
4Ø NEXT A
5Ø END
```

PASSWORD CODE I.D. SHEET

DATA BASE (Name)	ACCESS NUMBER (Phone No.)	PASSWORD LEVEL 1	CODE LEVEL 2

PSTPSSSSTPSSSPSSSTPS

GLOSSARY

ACK acknowledge; a computer-to-computer message that confirms data was received without error.
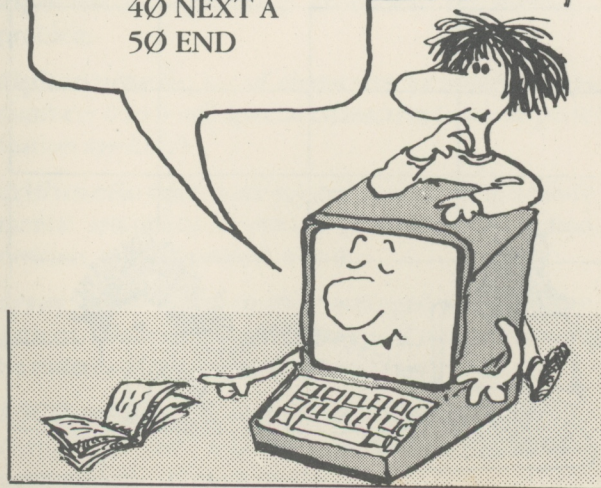
address the code name or number used to identify the exact location of certain information in computer memory.

algorithm step-by-step procedure for solving a problem.

alphanumeric set of characters including letters, numbers 0 to 9 and special characters (such as punctuation symbols).

arithmetic operator symbol representing a fundamental arithmetic operation (addition, subtraction, division, multiplication). $+ - * /$

array items of information arranged in an orderly pattern. (Example: three columns of numbers would be called a three dimensional array.)

ASCII American Standard Code for Information Interchange; the code used by most microcomputers to communicate through modems.

BASIC Beginners All-Purpose Symbolic Instruction Code; a high-level language.

binary code a two-digit operating system where 1 represents "on" and 0 represents "off".

bit a binary digit; the smallest unit of memory.

branch a point in a routine where one of two or more choices is made.

break to interrupt the execution of a program.

buffer area in RAM where information is accumulated for further processing.

bug an error in a program.

byte eight bits; the smallest addressable unit of information.

CPU Central Processing Unit of a computer.

character a symbol, number or letter.

character string sequence of characters that work as a single unit.

chip integrated circuits on a tiny silicon wafer.

color a character (;) used to separate statements on the same line.

command a user-initiated order specifying the operation to be performed.

nice Bytes.

BUG OFF!

THUNK!

ROSCO'S COMPUTER DE-BUGGING
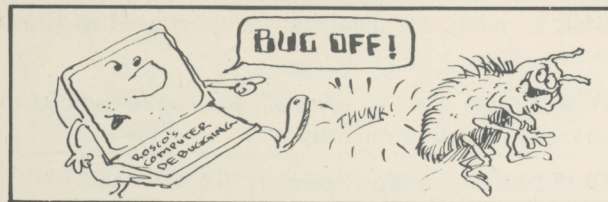
compiler the computer's program for translating higher-level languages into machine language.

concatenate to link string items together. (see STRING)

conditional branch a change in program operation controlled by a pre-specified condition.

connector a symbol for joining parts of a flowchart.

constant a quantity of unchanging value.

control character a keyboard character to start, modify or stop an operation.

control key keyboard character that causes a control action.

counter a process or mechanism for accumulating numbers in order of increasing or decreasing value.

debugging the process of testing a program for errors.

delete key a keyboard character that erases data from memory.

dimension the range of a proportion defined for an array.

directory a list of data contained in a file or group of files.

GAMES

STENCILS

STENCILS

STENCILS

disk a round, flat magnetic medium used to store information.

dollar sign a BASIC symbol ($) used to indicate a string operation or quantity.

DOS Disk Operating System.

editing the process of modifying data, programs or files.

error message a program message indicating the presence of a mistake.

entry point the point where execution of a program begins.

execution series of steps a computer performs to arrive at a result.

exponent number indicating how many times a value is to be multiplied.

file an ordered collection of data that can be stored.

flowchart a graphic representation of all operations and instructions needed to accomplish a task.

format the arrangement of data.

FORTRAN Formula Translation language used primarily in science.

glitch a sudden surge of electricity that can cause problems with computer circuits.
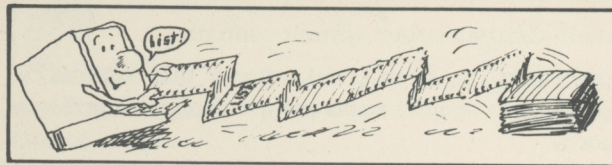
hardware the physical equipment composing a computer system.

header first part of a message.

index a number used to identify an item in a group of items.

infinite loop a loop that continues to repeat.

input information that is to be operated on.

integer a whole number; not a number with a fraction or decimal.

Kilobyte (K) one thousand bytes of memory.

language processor an internal computer code that converts data from one language to another.

line number the number followed by a program line.

LISP List Processing, a high-level computer language.

list a set of related items.

loop a sequence of instructions that is repeatedly executed.

memory a device in a computer or peripheral where information can be stored and retrieved.

nested loop a repeating task which allows the computer to carry out another repeating task.

null string a string without content.

operating system (OS) software that controls execution of programs and computer system performance.

operator the symbol or code indicating action to be performed.

output the action of transferring data out of a computer.

overflow a condition where an operation's results exceed a computer's processing capacity.

password a security code which permits access to restricted, stored information.

peripherals modular devices which may or may not be connected to the central processing unit.

PRINT a BASIC command, output of data on a monitor or paper.

printer a device that changes electronic data to readable, hard copy form.

program a numbered sequence of instructions, data or routines that solves a problem.

quotation marks a symbol (" or ") used in BASIC to designate a string quantity.

RAM Random Access Memory; the part of a computer's memory that can be changed or erased.
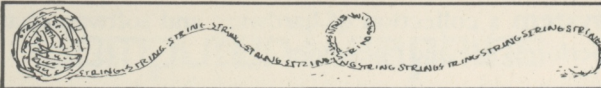
random number a number found entirely by chance.

return key a terminal key causing typed data to be input in RAM.

ROM Read Only Memory; the part of a computer's memory that can't be changed or erased.

routine set of instructions or data performing one or moe specified operations.

RUN an instruction that transfers a program from file to memory for execution.

software all instructions and data associated with the operation of a computer system.

sort an organized arranging of items based on a content variable

statement an instruction to the computer to perform a task.

string a connected sequence of characters.

string variable a variable, usually a letter, that reserves a location in memory for character data.

subscript an integer identifying a particular item in an array.

substring one or more integers or letters contained within a larger group of characters.

Syntax error A structural mistake in language input.

system a collection of hardware and software that performs specific operations.

table a collection of data stored for easy reference.

terminal a device capable of sending or receiving information; usually a keyboard and screen or touch sensitive screen.

time-sharing a plan or act in which terminals share a computer facility usually have one or more large scale central processing units. Timesharing can be done by terminals in one location or via communications links to remote locations.

unconditional branch an instruction that interrupts an operation and shifts control to another operation.

variable a symbol whose value can change during a program.

voice recognition the ability of some computers to translate spoken words into machine language.

word the number of bits or electric impulses a computer reads as a single item, usually in multiples of eight.

word processor a special-purpose computer that corrects typing mistakes, rearranges text and can sometimes automatically check for errors.

unconditional
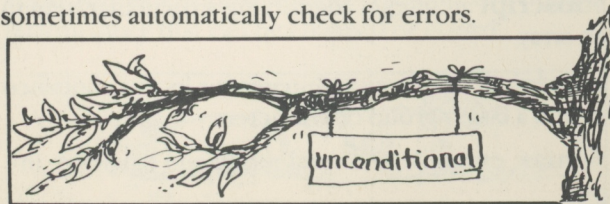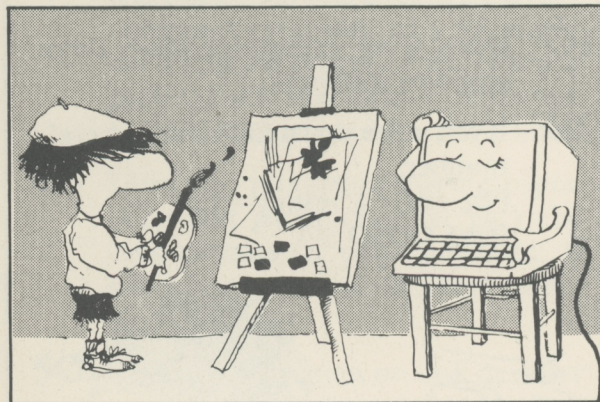
Computer Graphics

Computers can be programmed to display designs and charts. These are called **computer graphics.** Programming for graphics is determined by the kind of machine you have. Each is different.

Try to imagine the display screen as a giant grid of boxes. Inside each box is a light that can be turned on or off. On some computers, each light can be a color or special shape you choose. On other computers, you only have the choice of the light being on or off. Your computer manual will tell you about your computer's graphics ability.

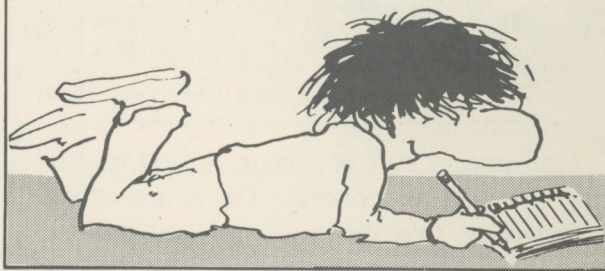**Graphics programming for all machines can be done by using a graphics sheet.**

STEPS IN GRAPHICS CHARTING

1Ø Does your computer have color graphics software?

2Ø If yes, write down Color next to code number.
(eg. red = 0, yellow = 1)
If no, GOTO 3Ø

| 0	1	2
3	4	5
6	7	8
9	10	11
12	13	14
15	16	17

3Ø What are the total number of vertical and horizontal line coordinates your computer's software uses for graphics? Cross the others off the charting paper. *Each machine is different.* Look in your manual for the answer.

4Ø Draw your picture on charting paper. (Charting paper on next pg.) Use *coordinates* in your program. If using color, use only as many colors as listed in 2Ø.

5Ø Store your program on disk or other media. Output your Graphics Program on monitor or dot matrix, ink jet or plotting printer.
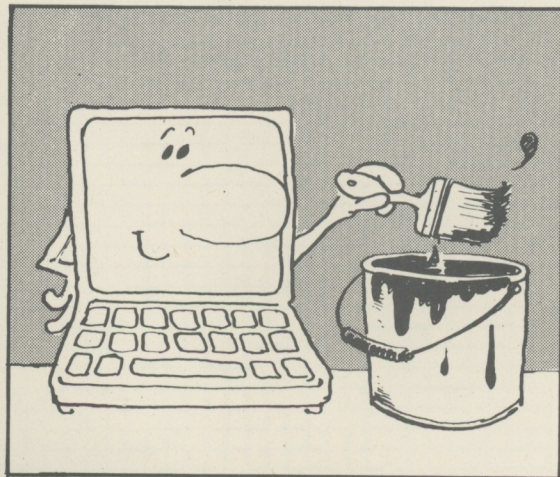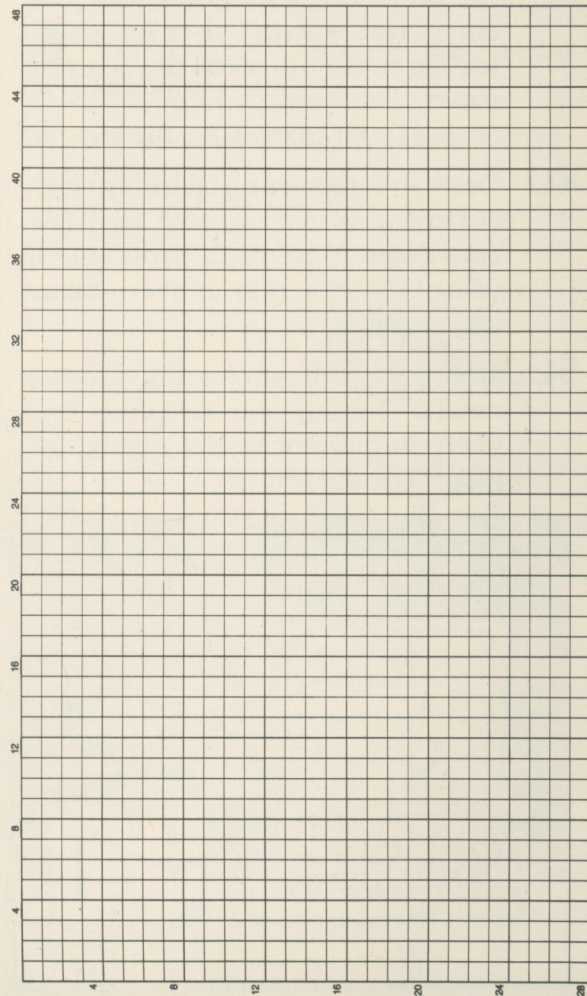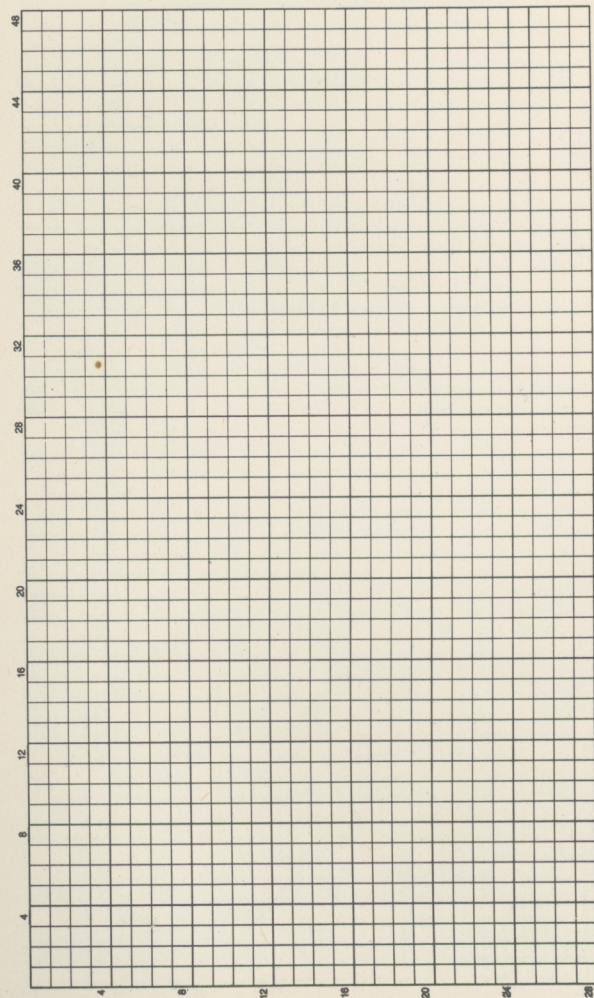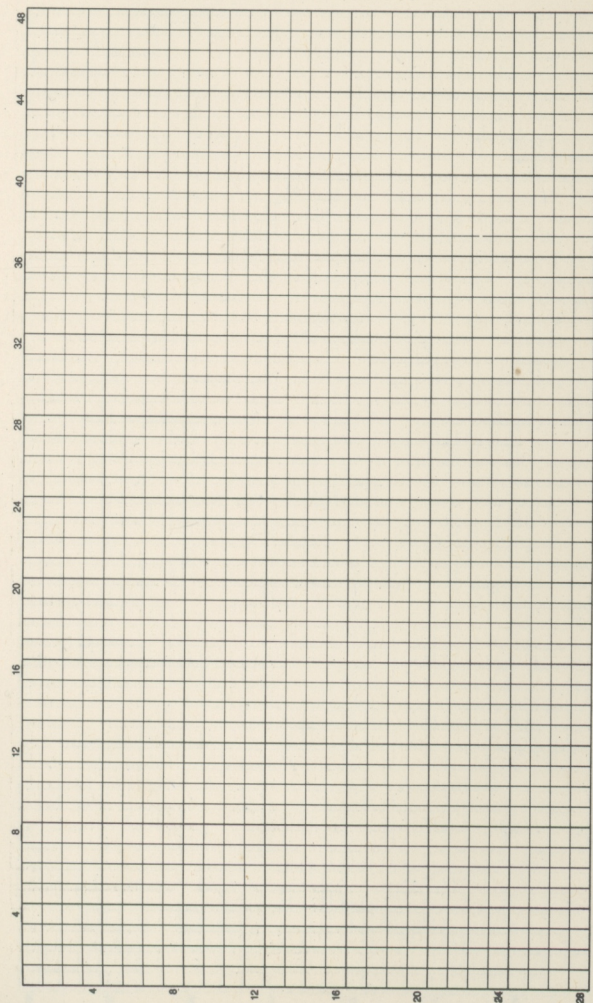
STENCILS
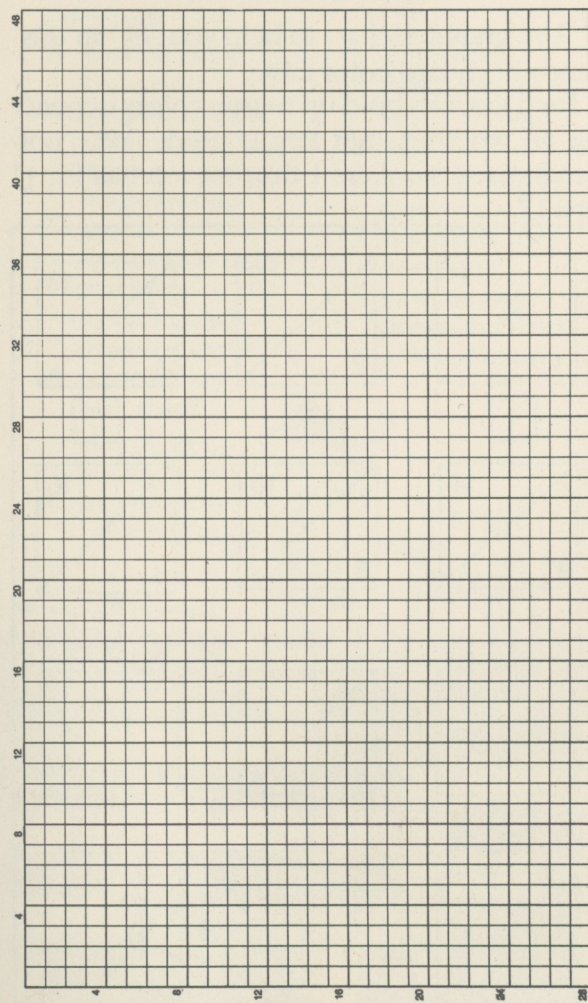
STENCILS

STENCILS

STENCILS

STENCILS

STENCILS

COLORS ON MY KEYBOARD

Use graphics chart to help you set up this handy keyboard color table.

Each key can hold up to two colors depending on whether shift key is used. Color bottom half for numbers 1 thru 10, top half for 11 thru 17.

11 / 1	12 / 2	13 / 3
! 1	@ 2	# 3
14 / 4	15 / 5	16 / 6
$ 4	% 5	¢ 6
17 / 7	/ 8	/ 9
& 7	* 8	(9
/ 10		
) 0		

TECH TALK CROSSWORD PUZZLE

ACROSS

1. written copy command
4. telephone communications link
5. magnetic storage with random access
6. device that helps machines to talk to each other
7. program error
8. information processed
9. central processing unit
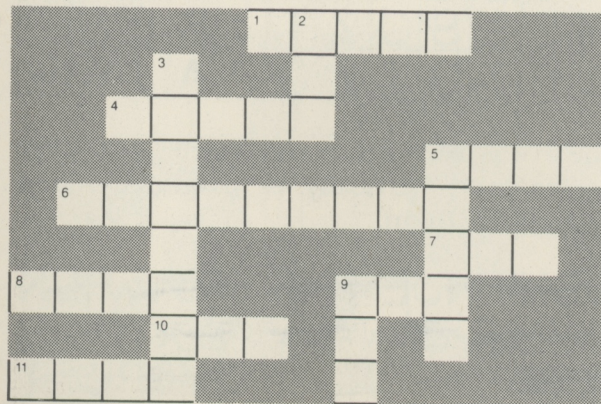10. memory that can't be erased
11. sequential magnetic or paper storage

DOWN

2. random access memory
3. programs for a computer
5. exterminate program errors
9. video monitor
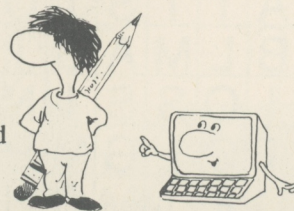
(Answer on back of this section.)

SEARCH STRINGS FROM DATA BASE

A	N	C	O	G	H	W	S	L	M	O	P
H	E	O	L	S	R	Q	X	I	B	L	A
E	X	C	L	E	A	R	O	B	T	I	G
Z	T	B	O	A	G	L	A	U	C	S	W
B	G	L	J	N	F	O	R	M	R	T	D
V	A	I	T	S	T	O	P	O	O	B	L
H	B	L	M	A	G	I	T	S	M	A	U
T	I	O	S	B	I	N	N	W	J	S	D
X	T	C	L	G	M	P	A	U	F	P	T
R	D	E	I	M	O	U	B	Z	E	N	D
M	E	L	B	O	Z	T	J	B	L	E	E
L	E	T	G	T	Z	O	P	A	J	W	R

The words listed below are hidden on the page horizontally, vertically or diagonally. Find and circle them.

CONTINUE · END · ROM · RUN
CLEAR · BIT · NEW · NEXT · FOR
RAM · LIST · INPUT · STOP · LET

MYSTERY LOOP
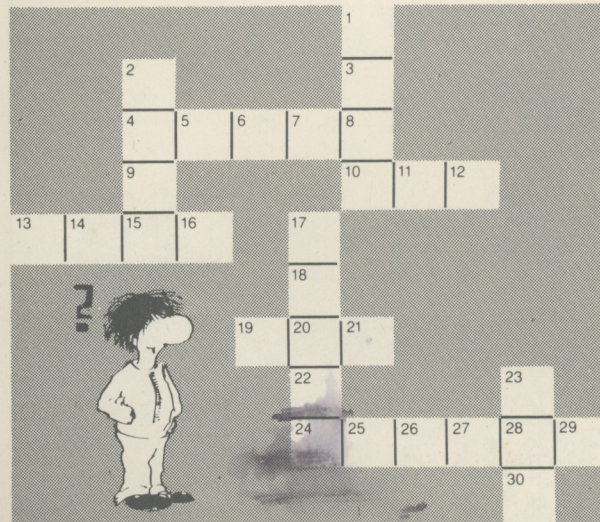
1Ø Complete the puzzle then GOTO 2Ø

ACROSS

4. keyboard entry
10. last line of a statement
13. loop statement
19. erases RAM
24. comment

DOWN

1. 8 bits
2. display program instructions (command)
17. erases screen
23. VDT

(Answer on back of this section.)

DECODE THE LOOP

2Ø Numbers below correspond to numbers in crossword puzzle box number 1Ø. Put letter from box on appropriate line to decode message. Then GOTO 3Ø
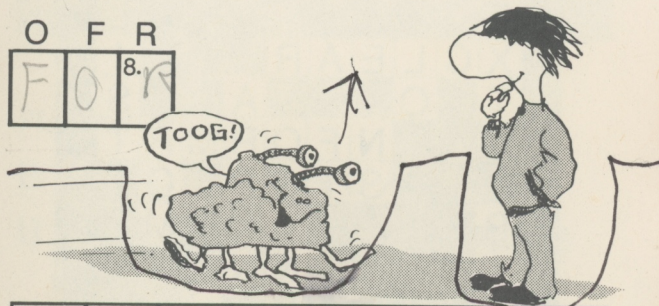
1	22	9	4	17			
2	22	5	13	7	22	13	10
7	9	10	9				
9	4	26	6	2	10		
21	14	24	12	9			

CLUE

UNSCRAMBLE BASIC

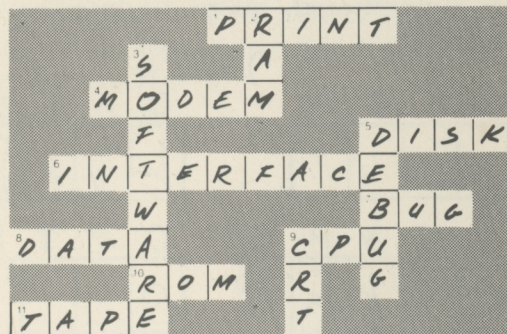**3Ø** Unscramble BASIC words below. Transfer letters in numbered squares to decode word at bottom.

R L E C A — c l e a r (1.)

D A L O — L O A D (2.)

R M K A R E — M A R K E R (3.)

O P T S — P o t s (4.)

U R N — r u n (5.)

T O O G — G o t o (6.)

T L E — L e t (7.)

O F R — F O R (8.)

TOOG!

| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
| C | O | R | S | U | t | e | R |

TECH TALK CROSSWORD

```
              P R I N T
              R
      S       A
      M O D E M
      O         D I S K
      F         E
    I N T E R F A C E
      W         B U G
    D A T A     C P U
      R O M     R   G
    T A P E     T
```

SEARCH STRINGS

```
N
E X C L E A R         L
X   O                 I
T   N F O R M R T      S
    S T O P   R O M    T
B   I     P   O
I   N P U T   N
T             U  E N D
              N  E
L E T            W
```

PUZZLE 1∅

```
                    ¹B
    ²L              ³Y
    ⁴I N P U T
    ⁹S              ¹⁰E N D¹²
¹³G O T O¹⁶         ¹⁷C
                    ¹⁸L
                  ¹⁹N E W²¹
                    ²²A     ²³C
                  ²⁴R E M A R K²⁹
                            ³⁰T
```

PUZZLE 2∅

BASIC LANGUAGE
USES SIMPLE WORDS

PUZZLE 3∅

CLEAR, LOAD, REMARK, STOP, RUN,
GOTO, LET, FOR = COMPUTER

A SHORT COMPUTER HISTORY

Why Computers Are Smaller & Work Faster Today

YEAR	ELECTRIC CURRENT CARRIED THROUGH	COMPUTER GENERATION	CALCULATIONS PER SECOND
1946	Vacuum Tubes	1st	1,000
1958	Transistors	2nd	10,000
1964	Integrated Circuits	3rd	1,000,000
1975	Integrated Circuit Chips	4th	10,000,000

Museum of Compu

This is Uncle Fred. They put him in here when he lost his memory...

1946
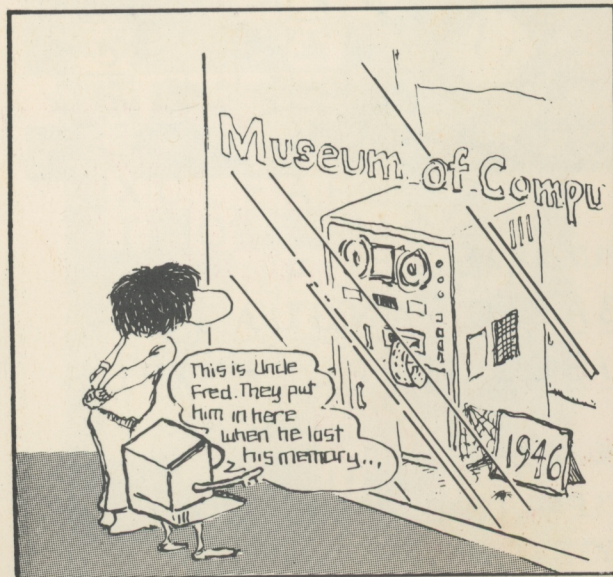
BASIC Flowchart

START OR STOP

START OR STOP
(THE BEGINNING OR END OF A PROGRAM)

PROCESSING
(INSTRUCTIONS TO HELP GET THE JOB DONE)

PROCESS

ARROW & CURVED ARROWS DIRECTION (TO BE FOLLOWED)

I/O

INPUT/OUTPUT
(PROGRAM INSTRUCTIONS FOR USER INFORMATION INPUT OR COMPUTER OUTPUT)

DECISION

DECISION
(POINT WHERE TWO CHOICES ARE POSSIBLE)

ADVANCED Flowchart I

PREPARATION

PREPARATION
(INSTRUCTIONS TO
CHANGE PROGRAM)

MODIFICATION
(USED TO ALTER PART
OF A PROGRAM)

**PROGRAM
MODIFICATION**

KEYING OPERATION

KEYING

CONNECTORS
(ENTRY TO OR EXIT
FROM ANOTHER PAGE)

**ENTRY
EXIT**

CONNECTORS

OFF
PAGE

(ENTRY TO OR EXIT
FROM ANOTHER PAGE)

ADVANCED Flowchart II

MANUAL OPERATION

ONLINE STORAGE

DOCUMENT

TERMINAL
INTERUPT

DISPLAY

PUNCHED TAPE

MANUAL INPUT

PUNCHED CARDS

MERGE

TRANSMETAL
TAPE
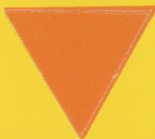
FLOW

COMMUNICATION LINK

SCHOOL TOOLS FOR EVERY AGE! EVEN THE COMPUTER AGE!